NIHSS SURROGATES AS A PREDICTOR OF 90-DAY FUNCTIONAL OUTCOME AFTER MECHANICAL THROMBECTOMY FOR M2 MIDDLE CEREBRAL ARTERY OCCLUSIONS

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Background Mechanical thrombectomy (MT) is the standard of care for anterior circulation proximal large vessel occlusion (LVO) stroke with salvageable tissue. Here, the National Institutes of Health Stroke Scale (NIHSS) 24 hours after MT has been shown to serve as one of the strongest predictors for 90-day functional outcome. Despite a lack of high-level evidence, M2 middle cerebral artery (MCA) occlusion stroke patients are frequently considered for MT due to their significant stroke burden. Therefore, predictors for 90-day functional outcome after M2 MCA MT require exploration.

Objective To evaluate the role of 24h-NIHSS as a predictor of functional outcome post-MT in M2 MCA occlusion stroke.

Methods Consecutive patients who underwent MT between February 2016 and December 2021 were retrospectively reviewed. LVO stroke was defined as ICA or M1 occlusion and was compared to M2 MCA occlusions. Baseline demographics, treatment characteristics, and functional outcomes at 90 days were collected using the modified Rankin Scale (mRS). In addition, NIHSS scores at baseline (B-NIHSS) and 24 hours (24h-NIHSS), as well as their difference (Δ-NIHSS), were assessed in multivariable logistic regression to assess potential predictors of 90-day mRS 0–2 (favorable outcome).

Results A total of 591 MTs were reviewed. Collectively, 84 cases with M2 MCA occlusions (41 females, 48.8%) and pre-stroke mRS of <3 were identified. The median age was 75 (IQR 60–83). The median B-NIHSS, 24h-NIHSS, and Δ-NIHSS were 14 (IQR 9–20), 8 (IQR 3–13), and 5 (IQR 1–9), respectively. TICI 2b/3 revascularization was achieved in 76/84 (90.5%) patients, and 2/84 (2.4%) suffered a symptomatic intracranial hemorrhage. A favorable functional outcome was achieved in 43/84 (51.2%) cases. In multivariable analysis, 24h-NIHSS was the strongest predictor for functional outcome. A total of 385 identified LVO strokes with pre-stroke mRS < 3 (M1 73.8%, ICA 26.2%) yielded B-NIHSS, 24h-NIHSS, and Δ-NIHSS were 18 (IQR 13–23), 10 (IQR 4–18) and 6 (1–12), respectively, M2-NIHSS and 24h-NIHSS were significantly lower in M2 MCA occlusion strokes compared to LVO strokes (p<0.001 and p=0.033, respectively), whereas Δ-NIHSS was similar between groups (p=0.291).

Conclusion Compared to proximal anterior circulation LVO stroke, M2 MCA occlusion strokes presented lower baseline NIHSS while yielding similar NIHSS improvement ranges with MT. NIHSS 24h after MT for M2 MCA occlusion stroke appears to be a similarly strong predictor of a functional outcome as it has been described for proximal anterior circulation LVO strokes.


FRACTAL ANALYSIS OF HEALTHY AND DISEASED VASCULATURE IN PEDIATRIC MOYAMOYA DISEASE

10.1136/neurintsurg-2022-SNIS.343

Background and Purpose Fractal dimension is a metric that assigns an objective measure to the notion of structural complexity. We sought to investigate differences in structural complexity between healthy and affected territories of cerebral vasculature in moyamoya, as well as associated scalp vasculature and native transdural collaterals, in patients with Moyamoya by comparing their respective fractal dimensions.

Methods Our cohort consisted of 12 patients with unilateral anterior circulation moyamoya with 15 associated transdural collaterals. Representative frames of distal arterial vasculature from internal and external carotid angiograms were selected then processed via automated image segmentation and also manually annotated by a cerebrovascular surgeon. In the affected hemisphere, the region with transdural collateral supply was analyzed, and compared to the contralateral region. The resulting skeletonized angiograms were then analyzed for their fractal dimensions.

Results We found the average fractal dimension (DF) of the moyamoya-side ICA was 1.82 with slightly different means for both the AP and Lateral view (mean = 1.82, stDev = .062; mean = 1.81, stDev = .067). The overall mean for healthy cerebral vasculature was also found to be 1.82 (AP view: mean = 1.83, stDev = .062; Lateral view: mean = 1.81, stDev = .069). Mean DF of native transdural collaterals was found to be 1.82 (AP view: mean = 1.83, stDev = .063; Lateral view: mean = 1.81, stDev = .069). The mean DF difference between auto-segmented and manually segmented images across all angiograms was .013 (stDev = .042).

Conclusion In accordance with the clinical understanding of moyamoya disease, the distal arterial structural complexity is not affected in moyamoya, and is maintained by transdural collaterals formed by vasculogenesis. Autosegmentation of cerebral vasculature is also shown to be accurate when compared to manual segmentation.

Disclosures D. Weber: None. K. Huang: None. A. See: None.

VIDEO ANALYSIS OF PATIENT PREPARATION IN THE ANGIOGRAPHY SUITE DURING EMERGENT THROMBECTOMY FOR ACUTE ISCHEMIC STROKE

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Introduction Thrombectomy is the standard of care for select acute ischemic stroke (AIS) patients with large vessel occlusion and reducing time to recanalization is critical in maximizing patient outcomes. Process efficiency is therefore important in moving patients through the acute stroke management pipeline from the time of their presentation to thrombectomy. We previously conducted a quality improvement project at our...
PROPRANOLOL AS A POTENTIALLY NOVEL TREATMENT OF ARTERIOVENOUS MALFORMATIONS: FROM BENCH TO BEDSIDE


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INTRODUCTION: Propranolol is a non-selective blocker of the β-adrenergic receptor and has been used for treatment of proliferative infantile hemangiomas. The vasoconstrictive and antiangiogenic effects of propranolol led us to explore its potential application for the treatment of AVMs.

METHODS: AVM tissue was cultured after surgical resection in the presence of 100 µM propranolol or solvent DMSO. After incubation for 72 hours, tissue was harvested for testing. The expression levels of SDF1α, CXCR4, VEGF and HIF-1 was measured by rt-PCR. Furthermore, data of patients in 2 vascular centres harboring AVM was retrospectively interrogated for a time period of 20 years. The database included information about hemorrhage, AVM size and antihypertensive medication. Descriptive analyses were performed, focusing on the risk of hemorrhage, size of the lesion at presentation and clinical follow-up in patients on β-blocker medication versus those who were not.

RESULTS: Among 483 patients, 73 (15%) were under β-blocker treatment. 48% AVMs presented with hemorrhage at diagnosis. Patients under β-blocker treatment had a lower risk of hemorrhage at the time of diagnosis in a univariate analysis (p < 0.0001; OR 13). Patients under β-blocker treatment showed a significant higher chance for a lower Spetzler-Martin grade ≤III (p < 0.0001; OR 6.5) and a lower risk for the presence of an associated aneurysm (p < 0.0001; OR 3.6). Multivariate analysis including Spetzler-Martin Grading, young age ≤ 50, presence of associated aneurysm and β-blocker treatment showed reduced risk for hemorrhage under β-blocker treatment (p < 0.01, OR 0.2). The expression of CXCR4 was suppressed by propranolol most likely through the HIF-1 pathways. The gene expression of vasculogenesis factors was decreased in with propranolol incubated AVMs.

CONCLUSION: β-Blocker medication seems to be associated with a decreased risk of AVM-related hemorrhage and AVM-size at presentation or during follow-up. Propranolol inhibits SDF1α-induced vasculogenesis by suppressing the expression of CXCR4 most likely through the HIF-1 pathways. Therefore, SDF1α/CXCR4 axis plays an important role in the vasculogenesis and migration of inflammatory cells in AVM lesions.